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Prevalence of lesions to the major vessels after penetrating abdomen traumas

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Abstract

Background. *Abdominal vascular injuries are among the most lethal injuries sustained by trauma patients. The aim of this study was to review the experience of our institution and to study published papers in respect to these injuries.*

Material and methods. *The report cards of a total of 174 patients who suffered from penetrating abdominal trauma caused by gunshots or stabbing in the period of May 1998 to April 2001 were reviewed. The Penetrating Abdominal Trauma Index (PATI) was used. Fisher tests with a confidence interval (CI) of 95% and a p-value < 0.05 were used in the statistical analysis.*

Results. *Twelve patients (6.9%) suffered from 14 lesions of major vessels, ten veins (6 inferior vena cava; 2 common iliac veins; 1 external iliac vein; 1 renal vein) and four arteries (2 internal iliac arteries; 1 renal artery; 1 external iliac artery).*

Conclusion. *Abdominal penetrating trauma affects young, usually male, patients, where abdominal vascular lesions are frequently involved. Abdominal vascular lesions are associated with a high mortality rate.*

Key words: abdominal penetrating trauma, vascular lesions

Introduction

Abdominal vascular injuries are among the most lethal injuries sustained by trauma patients [1]. Major vessel injury is seen in 5% to 25% of patients admitted to hospitals with abdominal trauma, and this is the most common cause of death of these patients [2].

In 1.3% of all vascular war injuries, abdominal vascular injuries caused by high-velocity military projectiles are evidenced, with extensive damage to tissues and bones, which are often associated with other injuries [3]. Highly lethal multiple arterial and venous injuries increase mortality [1–4]. Major abdominal vascular injuries are caused most commonly as a result of penetrating traumas [5]. Despite advances in transportation and resuscitation, mortality due to aortic and vena cava injuries remains largely unchanged. Shock upon admission, bleeding without retroperitoneal tamponade, acidosis and suprarenal location each play a significant role in mortality. Pre-hospital time and immediate identification of the injury along with rapid surgical intervention are the only factors that can improve the chances of survival from such devastating injuries [1, 6]. The aim of this study was to review the experience of our institution and to study published papers in respect to these injuries.

Material and methods

The report cards of a total of 174 patients who suffered from penetrating abdominal trauma caused by gunshots or stabbing in the period of May 1998 to April

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2001 were reviewed. The patients were treated in the emergency department where an investigation of the presence of lesions to major abdominal blood vessels was made. The Penetrating Abdominal Trauma Index (PATI) was used. Fisher tests with a confidence interval (CI) of 95% and a p-value < 0.05 were used in the statistical analysis.

Results

From a total of 174 individuals, with an average age of 29.4 years, treated for arterial and venous injuries, 125 (72%) suffered from stab wounds (SW) and 49 (28%) from gunshot wounds (GW) (Fisher test p-value < 0.0001). Among the SW victims 113 (90%) were male and 12 (10%) were female (Fisher test p-value < 0.0001). Of the one hundred (81%) SW victims the PATI score was from 1 to 10, while the same was true for 19 (42%) of the GW victims (p-value < 0.0001). The average PATI score for SW patients was 6.7, whilst in GW patients it was 15.29. The average PATI score for SW patients who died was 29.4, while for the GW patients it was 29.

Twelve patients (6.9%) suffered from 14 lesions of major vessels, ten veins (6 inferior vena cava; 2 common iliac veins; 1 external iliac vein; 1 renal vein) and four arteries (2 internal iliac arteries; 1 renal artery; 1 external iliac artery). Of the stabbings, there were five patients who suffered six lesions of major vessels, four veins and two arteries, and in the gunshot victims there were seven patients who suffered eight lesions of the major vessels (p-value $<<$ < 0.03). The average PATI score of GW patients with major vascular lesions was 45.4 and for SW patients the score was 27.2. Mortality occurred in 25% of the patients.

Discussion

The number of patients suffering from abdominal traumas has grown with the increased urban violence where access to military weapons by the population is associated with an increase in the degree of the injuries caused. In large urban centres many of these aggressions can be compared to those of an armed conflict. Consequently surgeons need to be prepared to treat patients as if it were really a war. Abdominal vascular lesions are associated with mortality rates which reach 54% of the total number of cases [3]. The severity of the wounds demands adequate training of the medical team, principally in respect to the treatment of vascular lesions.

In our trauma centre, a total of approximately 60 cases of abdominal penetrating wounds are seen per year. The training of the medical team from the emergency first aid of the patient at the scene of the accident and the rapid transportation of the patient to the efficient intervention approach of the surgical team has helped to reduce mortality. The possibility of both the trauma and vascular surgeons treating the patient simultaneously permits the use of non-routine techniques such as embolisation and the use of lined stents.

In this study, abdominal penetrating lesions by stabbing were more common than those from gunshots. However, wounds from gunshots were more serious even though the average PATI mortality scores were similar for both groups. This proves that the outcome is related to the severity of the lesion and not to the type of weapon used.

The percentages of venous and arterial lesions involved were similar, both in this work and in another published study [3].

Traumas involving the aorta and the vena cava veins present fatalities in about 70% of cases [3, 7]. The association of these with other vessels increases the mortality rate where the involvement of more than 4 vessels inevitably results in death [3]. In this study only two patients had the association of both venous and arterial vessels with one leading to death. In all of the victims the vascular lesion was associated with lesions to other vital organs. Men were the most frequently affected by this type of aggression, and generally the victim was relatively young with the average age being only 29.4 years. Vascular lesions occurred in 6.9% of patients who suffered from abdominal penetrating trauma, with the worst cases being after gunshot wounds.

Published studies have shown that from 5% to 25% of urban abdominal traumas include vascular lesions [1]. Whilst in armed conflicts, a total of 1.3% to 2.9% of abdominal traumas include vascular lesions [1, 3]. Penetrating wounds represent the majority of abdominal vascular injuries [7, 8].

Mortality was seen in 33.3% of the total abdominal penetrating trauma cases in this study. Venous lesions were involved in 66.7% of these cases and arterial lesions in the remaining 33.3%.

Ligature was the most common procedure reported by one publication, in which a total of 245 ligatures were performed (141 primary re-constructions, 24 inter-positional using a prosthesis and 2 using autogenic grafts).

An appropriate and objective investigation of each case, both clinically and using imaging, evaluating the severity of each case permits the selection and intervention of a quicker and more efficient approach. The time between the injury and intervention, and a more precise diagnosis in the pre-operative period enables a more adequate decision and conduct.

The immediate control of bleeding using external pressure and vascular clips, haemodynamic stabilization, biochemical and thermal control and the utilization of antibiotics when indicated all are part of the therapy for these patients.

Conclusion

Abdominal penetrating trauma affect young, usually male, patients, where abdominal vascular lesions are frequently involved, and are associated with a high mortality rate.

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